Notices. All notices required to be given by the parties hereunder shall be hand delivered or given by certified or registered mail to the individuals at the addresses set forth below. Either party may from time to time designate in writing substitute addresses or persons to whom such notices shall be sent.

State of Colorado	[Contractor]
Attn: MNT Project Director	Attn: Specify
Name	
2452 W. 2nd Avenue, #19	Address
Denver, CO 80223	City, ST Zip

21. GOVERNMENTAL IMMUNITY. Notwithstanding any other provisions of this Contract, no term or condition of this Contract shall be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protection, or other provisions of the Colorado Governmental Immunity Act, section 24-101, et. seq. , C. R. S. , as now or hereafter amended.

22. WAIVER. The waiver of any breach of a term, provision, or requirement of the Contract shall not be construed or deemed as waiver of any subsequent breach of such term, provision or requirement, or of any other term, provision, or requirement.

23. GOVERNING LAW AND VENUE. The laws of the State of Colorado shall be applied in the interpretation, execution, and enforcement of this Contract. The venue for any judicial action relating to performance of this contract shall be in the City and County of Denver.

24. YEAR 2000 WARRANTY.

The contractor warrants that any software, firmware, or supplies delivered, or services performed, this contract to be used before, during, and after the turn of the century (January 1, 2000) are "Year 2000 compliant." "Year 2000 compliant" means fault-free performance in the processing of date and date-related data (including, but not limited to calculating, comparing, and sequencing) by all software products, firmware, and supplies, individually and in combination as a system, when used in accordance with the product documentation provided by the contractor. Fault-free performance means:

- no invalid or incorrect results or abnormal termination prior to, during, and after January 1, 2000 as a result of date or date-related data or data processing that represents or references different centuries or more than one century; and
- proper calculation and handling of leap years: and
- except for normal user interfaces (e.g. four digit date entry) identified in the contractor's or vendor's documentation, such date data processing shall be transparent to the user.

In the event this warranty is breached, the State may elect to (1) return the software or supply and receive a refund of the purchase price (in the case of delivered software or supplies) or (2) require the contractor to make all code revisions or repairs/replacements of firmware or supplies, as well as revisions to associated documentation, at no cost to the State in order to ensure that the software, firmware or supplies are Year 2000 compliant so long as notice of such defect is provided no later than 90 days after discovery. This warranty shall survive acceptance of the software, firmware, or supplies and is not subject to any disclaimer or limitation of warranty or other limitation of the contractor's liability which may be specified in the contract. The remedies specified herein shall not be exclusive remedies and shall not limit any other remedy at law or equity available to the State

25. ENTIRE UNDERSTANDING. This Contract constitutes the entire understanding between CUSTOMER and [CONTRACTOR'S NAME]. No prior or contemporaneous addition, deletion, or other amendment hereto shall have any force or effect whatsoever, unless embodied herein in writing. No subsequent novation, renewal, addition, deletion, or other amendment hereto shall have any force or effect unless embodied in a writing executed and approved pursuant to the State Fiscal Rules.

26. In the event of conflicts or inconsistencies between this Contract and its Exhibits or attachments, such conflicts or inconsistencies shall be resolved by reference to the documents in the

1) Colorado Special Provisions,
2) Contract,
3) The RFP, Exhibit A.
The Vendor's RFP Response, Exhibit B. The "Project" Schedule, or subsequent changes to the

27. COLORADO SPECIAL PROVISIONS. The Colorado Special Provisions, required by Fiscal Rule 3-1, 1

and shall govern in the event of any conflict or inconsistency between the terms of any order and this Contract. With respect to paragraph 1 of the Special Provisions, State Controller or designee approval is not required for State

Exhibit ___

Sample Bilateral Change Order Letter

Date: _____

State Fiscal Year 2000-2001

Bilateral Change Order Letter No. _____

In accordance with Paragraph _____ of contract routing number _____, AMA _____, between **State of Colorado, General Support Services, Telecommunication Services** and Contractor

covering the period of January 15, 2000 through June 30, 2005 the undersigned agree that the supplies/services affected by this change letter are modified as follows:

Services/Supplies

Price/Cost

The maximum amount payable by the State for _____ [service] [supply] _____ in Paragraph _____ is (increased/decreased) by ($ amount of change) to a new total of ($ _____) based on the unit pricing schedule in accordance with the applicable service category submitted in the Contractors RFP Proposal which governs Service to the state. The first sentence in Paragraph___ is hereby modified accordingly;

OR

The parties agree that the changes made herein are "no cost" changes and shall not be the basis for claims for adjustment to [price] [cost ceiling], delivery schedule, or other terms or conditions of the contract. The parties waive and release each other from any claims or demands for adjustment to the contract, including but not limited to price, cost, and schedule, whether based on costs of changed work or direct or indirect impacts on unchanged work. Controller approval of this "no cost" change is not required. ____ contractor initials. ____ Agency initials.

This change to the contract is intended to be effective as of _____, but, except with respect to "no cost" changes identified above, in no event shall it be deemed valid until it shall have been approved by the State Controller or such assistant as he may designate.

Please sign, date, and return all copies of this letter on or before _____ 19____.

Contractor Name:

By: _____
Name _____
Title _____

State of Colorado:
BILL OWENS, GOVERNOR

By: _____
For the Executive Director
Colorado Department of _____

APPROVALS:

By: _____
For _____ Division

FOR THE STATE CONTROLLER
Arthur L. Barnhart

By: _____
State Controller or Designee

Exhibit _____

Date: _____

[Contractor]
[Address]

In accordance with Paragraph _____ of contract routing number _____, FAA ADA _____, between **State of** and Contractor

covering the period of January 15, 2000 through June 30, 2005 the State hereby exercises the option for Year ___,

As approved in the Contract, if the final approved changes the State's financial obligation hereunder, an amended Open Exercise Letter must be executed. Upon proper execution
constitute notice to continue "MNT" system service for the next year. The maximum amount payable by the State for this Phase ___ is $_____ it has been approved by the State Controller or such assistant as he may designate.

BILL OWENS, GOVERNOR

For the Executive Director

_____
Title

FOR THE STATE CONTROLLER
Arthur L.

By: _____
For _____ Division

By: _____
State Controller or Designee

Indefinite Quantity Contract Funding Letter

Exhibit _____

Date: _____

TO: [Contractor]

SUBJ: Indefinite Quantity Funding Letter No. _____

In accordance with Paragraph _____ of contract routing number _____, AMA _____, between the **State of Colorado, General Support Services, Telecommunication Services** and

[Contractor]

covering the period of January 15, 2000 through June 30, 2005 the undersigned commits the following funds to the contract:

The amount of funds available and specified in paragraph ____ is (increased/decreased) by ($ amount of change) to a new total funds available of ($_____) to satisfy orders under the contract. Paragraph ____ is hereby modified accordingly.

This funding letter does not constitute an order for services under this contract.

This funding letter is effective upon approval by the State Controller or such assistant as he may designate.

State of Colorado:
BILL OWENS, GOVERNOR

By: _____
For the Executive Director
Department of _____

APPROVALS:

By: _____
For _____ Division

FOR THE STATE CONTROLLER
Arthur L. Barnhart

By: _____
State Controller or Designee

Exhibit ___
Deliverable Implementation Schedule

To be detailed:

Exhibit ___
State Furnished Equipment

Location	Equipment Description

Section 3 - Statement of Work

3.0 Overview

The State desires to establish a single backbone network "cloud" based on Asynchronous Transfer Mode (ATM) technology to carry voice, video, and data traffic in a fully interoperable environment. This backbone cloud will be monitored and managed by the Offeror on a 24 hour, seven day a week, 365 days a year (24 x 7 x 365), basis. The Multi-Use Network will consist of 70 points of service around the state called *Aggregated Network Access Points* or *ANAPs*. The State reserves the right to negotiate additional site implementations during the course of the awarded contract. An ANAP is not necessarily a physical presence or installation, but rather will be defined as a minimum of 20 Mb of access capability for State network users in an area. High-speed network access, preferably over fiber, will be delivered to these locations by the provider and distributed to users over appropriate links. Asynchronous Transfer Mode (ATM) is the desired transport method. In addition to those sites defined as ANAPs requiring 20 Mb of service, four other sites have been designated as Super ANAPs or SANAPs which require at least 155Mb service due to concentrations of traffic primarily in the metro area. Offerors must specify how their existing service structure and planned improvements will meet the telecommunications requirements of the Multi-Use Network. This RFP seeks a strategic partner who will assume responsibility as a Prime Contractor, from now on referred to as "Offeror", to create a mutually beneficial public/private partnership with the State as "anchor tenant" for increased telecommunications performance and the extension of advanced technologies throughout Colorado.

The State will insist on a 36 month implementation schedule in which Multi-Use Network services are completed and available in 30% of sites in year one (minimum of 21); 50% of sites in year two (an additional 35 sites for a total of 56); and 20% of sites in year three (the remaining 14 sites). The State intends to contract for these services for a period of five years with five one year renewable option years for a potential total of ten years for the services. As an ANAP is established, the current state telecommunications lines in that area will be transferred, whenever possible, to access the newly established "cloud". The State also anticipates locating edge switches at points of high user demand. These edge switches will be included in the responsibilities of management and monitoring.

A companion piece to the MNT Strategic Plan relates to *Community Incentive Funding* or *community based access grants*, a means to fund and facilitate the participation of community level stakeholder aggregation (that is, other than State agency offices) to extend MNT-recommended infrastructure upgrades to every Colorado community. A bill informally known as the "Beanpole Bill" (HB 99-1102) was passed in the 1999 legislative session to establish a grant program for local communities. Enabled with "Beanpole" funding, each community can aggregate its multiple sources of telecommunications demand from education, government, library, health care, and other

public or non-profit sectors. This community-level aggregated demand is intended to provide the "anchor tenant" to resolve "last mile" problems even in communities without significant State government telecommunications requirements. Local ANAPs (aggregations of non-State user requirements) will be formed within the self-defined community to aggregate telecommunications services. The concept is to achieve a critical mass of demand and facilitate extension of the capabilities of the Multi-Use Network. First year funding defined in the "Beanpole" bill is $4.676 million, with additional funding dependent on demonstrated success of the program. The Executive Director of the Department of Personnel/General Support Services is required within available resources to connect any "Beanpole" community to the Multi-Use Network so the Offeror can anticipate additional traffic from the ANAPs with the growth of that traffic dependent upon the rate of distribution and completion of community based access grants. Offerors will be required to coordinate their Multi-Use Network efforts with the activities of the "Beanpole" project communities. A copy of HB 99-1102 along with other descriptive and contact information on the "Beanpole" project can be found in Attachment 5.1 of this RFP.

At the end of this project the State will have aggregated its current demands and combined its existing networks into a single ATM "cloud" network extending its capabilities to every community throughout the State of Colorado.

3.1 Proposal Instructions

Unnecessarily elaborate proposals are not encouraged. The proposal must be in no less than 12 point type, with one inch margins. Where page limits are specified, the State reserves the right to not consider any pages that exceed the page limit.

Proposals should be organized as follows:

Executive Summary (4 pages max)

The proposal response must follow the stated requirements and requests for response to questions in the following categories:

Offeror Qualifications / Experience
Technical Requirements
Management and Monitoring
Project Management
Cost

Attachments

Brevity and clarity is expected in each category. Offerors are strongly encouraged not to include any marketing material as filler or in place of more specific narrative responses.

3.2 Offeror Qualifications / Experience

3.2.1 Qualifications

This section defines the minimum acceptable qualifications that must be met for an Offeror to respond to this RFP. The State of Colorado recognizes that the scope and complexity of the Multi-Use Network infrastructure and services may require an Offeror to propose that it shall act as the **Prime Contractor**, with a number of other service providers acting as **Sub-Contractors** to the Prime Contractor. However, the qualifications set forth here shall pertain to the individual Prime Contractor for the Offeror's team of service providers. . As part of its evaluation process, the State will be assessing the Offeror's understanding of local issues and environment. Consequently, the State assessment will view the use of local partnerships and subcontractors, for example, as a means of demonstrating local understanding.

> **Note:** Notwithstanding the use of approved subcontractors, the Offeror, if awarded a contract under this RFP, shall be the **Prime Contractor** and shall be responsible for all work performed. **Right to Refuse Sub-Contractors** - The State reserves the right to refuse, for cause, any proposed subcontractors.

The Offeror / prime contractor is required to show that it is a financially stable organization capable to assume the capital investment required to build, operate, and maintain a statewide network infrastructure. For the purposes of this RFP, the State of Colorado DOP requires:

3.2.1.1 Requirement: The Offeror / Prime Contractor shall provide a brief narrative description of their qualifications to deliver the services sought in this RFP. This narrative shall cover at the following topics:

3.2.1.1.1 Requirement: Experience or participation in planning, designing, implementing, and operating a network infrastructure of similar scope to the one sought in this RFP.

3.2.1.1.2 Requirement: Experience with wide area network migration and implementation for Projects of similar size to the Multi-Use Network where aggregation of a diverse network infrastructure into a new, state-of-the-art wide area infrastructure was required.

3.2.1.1.3 Requirement: The Offeror's or proposed sub-contractor's previous experience staffing and operating a 24x7x365 Network Operations Center (NOC).

3.2.1.1.4 Requirement: The Offeror's or proposed sub-contractor's previous experience providing outsourced network management services for a wide area network similar in size and scope to what is sought in this RFP in the following

areas of Open Systems Initiative (OSI) Network Management: Fault Management; performance management; configuration management; capacity management; and account management.

3.2.1.2 Requirement: The Offeror shall provide a description of their background and organizational history, including:

3.2.1.2.1 Years in business;

3.2.1.2.2 Location of offices; and,

3.2.1.2.3 Form of business (corporation, partnership, joint venture, LLC, etc.)

3.2.1.2.4 A description of the offering organization's size, longevity, and client base. Note: The State is not setting any requirement as to the size of the Prime Contractor.

3.2.1.3 Upon Notice of Intent to Award, the Prime Contractor shall supply documentation of financial responsibility, financial stability, and sufficient financial resources to provide the services sought in this RFP, within the required time frames. This response must include:

3.2.1.3.1 Other financial information by which the State may reasonably formulate an opinion about the relative stability and financial strength of the Prime Contractor. This information shall include the most recent audited financial statement or a banking reference and a credit rating by a rating service.

3.2.2 Experience

Requirement: Proposals shall provide the following information to support the Offeror's experience in delivering services such as those sought under this RFP:

3.2.2.1 A brief description of how long the Offeror has been performing the services sought under this RFP.

3.2.2.2 Two lists of key personnel, one for key staff whose responsibilities will be primarily implementation (Project Management) and a second for key management and maintenance staff whose responsibilities will be ongoing for the duration of the contract. These lists shall include definitions of the level of responsibility and involvement for each person, and brief descriptions which should detail each individual's title, education, and employment history. These lists shall also identify key subcontractor personnel. Note: Right to Refuse Personnel - The State reserves the right to refuse, for cause, any subcontractors or any personnel provided by the prime contractor or its subcontractors.

3.3 Technical Requirements

3.3.1 Scope of Service

The scope of the Multi-Use Network (MNT) Project includes the following:

Design, construction, implementation and delivery of a flexible, scalable and high-speed statewide network infrastructure based on the following as found and specified in the following sections:

Section 3.3.2.1
A single backbone network "cloud," based on Asynchronous Transfer Mode (ATM), for voice, video and data, that can provide a wide variety of advanced services in a fully interoperable environment.
Extension of the "cloud" to provide connectivity from the backbone network to all 64 counties in the State of Colorado through Aggregated Network Access Points (ANAPs).
Support for introduction of new and emerging technologies into the "cloud" as they are developed.

Section 3.3.2.2
20Mbps or greater to State Edge Sites from the MNT wide area network infrastructure and ANAP points of service.
155.5 Mbps or greater to all SANAPs .
Advanced service offerings.
Anticipated growth plan for connectivity to the public/private sectors.
Technical Specifications for ATM and other service offerings.

Section 3.3.2.3
Traffic Management for ATM with Quality of Service parameters.

Section 3.3.2.4
ANAP/SANAP Implementation.

Section 3.3.2.5
Connectivity to State agency End Sites.

Section 3.3.2.6
Network Monitoring and Management for MNT backbone, ANAPs, SANAPs, Edge Sites and End Site locations.
24x7x365 NOC operations.
Service Level Agreements.

Section 3.3.2.7
Project Management.

Description of Network Physical Layout Requirements

The network physical layout is the physical network's topology and overall architecture that is to be deployed throughout the State of Colorado. Designing and implementing a statewide network infrastructure will require a hierarchical network architecture and a geographically dispersed physical presence to all counties and service access points desired by the State agency End Sites. The new MNT wide area network infrastructure will be based on the following building blocks:

WAN Links – The point-to-point, partially-meshed, fully meshed, and/or ring configuration, wide area network links used by the Offeror to interconnect ANAPs to ANAPs and Edge Sites and End Sites to ANAP points of aggregation and service.

ANAPs – (Aggregated Network Access Points) The network backbone points of aggregation and service within the wide area network for network connections from local Edge Sites and End Sites within close proximity to that location. Each ANAP will be based on ATM technology and have the capability of handling data, video and voice services. An ANAP should be owned by the Offeror but, if necessary, the State could provide assistance with a site and switching capabilities.

SANAPs – (Super Aggregated Network Access Points) State owned sites of extremely high concentration of users and demand for integration of services. Sites designated for a State owned, and Offeror monitored and managed, ATM switch. These sites are determined critical in nature and will require SONET protection switching and diverse WAN Link paths. The following are State designated SANAPs according to location and WAN Link bandwidth requirements:

690 Kipling, Lakewood, CO - OC-3 (155.5 Mbps) with migration to OC-12 (622.08 Mbps)
1525 Sherman, Denver, CO – OC-3 (155.5 Mbps)
4201 Arkansas, Denver CO – OC-3 (155.5 Mbps)
University of Colorado at Denver (UCD), Denver, CO – OC-3 (155.5 Mbps)

Edge Sites – State owned sites, other than SANAPs, with a high concentration of users and demand for integration of services. Sites designated for a State owned, and Offeror monitored and managed, ATM switch with WAN Link bandwidth requirements of DS-3 (44.736 Mbps) or higher.

End Sites – The locations at which the State agencies, Higher Education, and other public entities will originate connections to the MNT Offeror's ANAP and core backbone network.

Design factors the Offeror shall consider in its response include but are not limited to:

- Universal "cloud" service offering that can deliver a broad scope of ATM products and services at a cost-effective rate. This would be enabled by the build out of the new MNT wide area network infrastructure, with the State of Colorado acting as "anchor tenant."

- Hi-speed communication MNT WAN links, switching, and transport systems based on industry accepted standards from the ATM Forum, IETF, ITU, IEEE, Bellcore and ANSI.

- Quantity and anticipated growth of MNT users and network systems for a given physical location, city or town

- Analysis of aggregating network traffic at specific ANAP locations for the MNT wide area network infrastructure based on population, network traffic, SANAP, Edge Site and End Site demand

- Flexible and scalable network bandwidth and network connectivity to MNT State SANAPs, Edge Sites and End Sites throughout the state that minimizes inter-LATA crossing charges and charges associated with mileage

- Fully integrated, all-inclusive network services priced per Mb of traffic carried

- Capital investment costs to build a new network or upgrade an existing one, and network equipment and systems already in place throughout the state that can support the flexible and scalable network connectivity requirements of the MNT backbone

- Analysis of combining local loop and intra-LATA circuits to inter-LATA and wide area network circuits. This will enable partnering between LECs and IXC carriers to provide an end-to-end solution in support of MNT network connectivity requirements

- End Site connectivity for state agencies and other public entities to the MNT wide area network "cloud" through ANAPs with advanced service offerings

- State outsourcing of MNT network management services for any State owned ANAPs, SANAPs, Edge Sites and user specified End Sites

- Network management services on a per managed unit basis

- Inclusion of management services and systems of State owned ANAPs SANAPs and Edge Sites as part of the overall network price

- Rollover of new and existing state circuits. (Current circuit contracts which can be optionally bought out, rolled over, or absorbed upon expiration, can be found in Attachment 5.5)

- Provision for the majority of current state traffic ultimately terminating in Denver SANAPs

3.3.2 Technical Responses

This section presents the technical questions and technical responses desired by the RFP evaluation team as part of the Offeror's overall Multi-Use Network RFP response. This is provided as detail of the Statement of Work. The response format and scoring are in Section IV of this RFP, Proposal Format and Evaluation.

The following modules contain the State's description and requirements of the MNT statewide network MNT backbone infrastructure and service offerings. Requirements include specifications for Offeror response.

A specification is any description of the physical or functional characteristics or nature of the supply or service. Specifications are drafted with the objective of clearly describing the State's requirements. A requirement is a statement of the specific need(s) of the State. All requirements will be evaluated and are identified in Sections III and IV by **Bold** letters and preceded by the word "requirement." Certain requirements are mandatory and must be met for award. These mandatory requirements are identified in Sections III and IV by the notation "**(M)**."

3.3.2.1 MNT Backbone Infrastructure

The State requires a highly flexible, scalable and reliable backbone infrastructure, based on ATM technology, to transport its data, voice and video traffic. This backbone infrastructure will provide the basis for the creation of a network "cloud" incorporating Offeror-owned ANAPs (and State owned ANAPs if required by Offeror) with connectivity to State-owned and switched SANAPs, Edge Sites and state agency End Sites. The "cloud" architecture will require any SANAP, Edge Site and End Site to ultimately have only a single connection to reach any of potentially multiple destinations throughout the state. The "cloud" should eliminate backhaul and InterLATA charges and be capable of providing uniform and interactive transport and connectivity to all counties and specified locations throughout the State of Colorado.

SONET is the preferred backbone mechanism to provide redundant and diverse path capabilities for network survivability. Asynchronous Transfer Mode (ATM) is the required primary transport protocol, with Frame Relay services made available to state agency End Sites. ATM/Frame Relay integration is required. Other advanced services such as transport of Internet Protocol (IP), ISDN, Digital Subscriber Line (xDSL), video (H.320, H.323, MPEG 2), voice (PBX connectivity, trunking, etc.) are requested to all counties and End Sites, with integration over ATM to Edge Sites, as part of the MNT. A 20 Mbps or greater is required to each of the 64 counties in the State and a possible excess of 2.4Gbps (OC-48) to some. (See Attachment 5.4)

The overall design of the physical and switched backbone network will be left up to the Offeror of this RFP, based on, but not limited to, the design criteria and needs listed in this document. The State, however, requires knowledge of the technical approach used by the respondent to deliver any of the above services.

The actual quantity and location of ANAPs that are physically designed into the MNT network backbone infrastructure will be left to the Offeror's discretion as long as the goal of providing a cost effective, scalable, integrated, and hi-speed network "cloud", which eliminates backhaul and LATA boundary barriers to the end user community, is achieved. There is one exception: At least five statewide ANAPs are required to enable a redundant and diverse network

3.3.2.1.1 Requirement: The Offeror shall provide a detailed description of the technical approach that will be used to deliver a single MNT "cloud" based on ATM technology to all counties in the state.

3.3.2.1.2 Requirement: The Offeror shall provide a high-level diagram indicating any redundant and diverse paths used for MNT backbone survivability. Show all ANAP locations provided by the Offeror and any State owned facilities where co-location is deemed required. Provide bandwidth provisioning between all ANAPs. Indicate and list locations served by, and names of, all companies and partnerships involved in the backbone delivery of services. As noted above, the State believes that at least five statewide ANAPs are required to enable a redundant and diverse network.

3.3.2.1.3 Requirement: The Offeror shall address how the proposed technical approach will minimize punitive costs due to such factors as distance and LATA boundaries.

3.3.2.1.4 Requirement: A capacity planning process is critical throughout the life cycle of the backbone network. The Offeror shall describe their technique for such a process and their ability to adapt to State business needs in order to maintain future growth.

3.3.2.2 ANAP and SANAP Connectivity and Bandwidth Requirements and Service Offerings

ANAPs are Offeror-owned sites used to aggregate data, voice and video traffic onto the MNT wide area network backbone infrastructure. They will be initially configured to handle 20Mbps or greater of ATM service from the Offeror to State Edge Sites and State agency End Sites. Actual ANAP locations will be proposed by the Offeror and negotiated upon award of the MNT contract.

"Super" ANAPs, or SANAPs, are designated as critical, State owned sites, identified for large capacity backbone connections and aggregation, 155.5 Mbps (OC-3) to 622.08

Mbps (OC-12) and requiring ATM service over SONET transport with diverse paths for network survivability. These SANAP sites were identified as high traffic sites through several analysis criteria such as: preparation for Internet II presence, high potential usage for video applications using network protocols, mainframe and server access and other switching and routing needs. A list of SANAP locations with their bandwidth requirements can be found in Attachment 5.4.

ANAP connectivity and implementation must be incorporated into the backbone network and extend the universal "cloud" to all counties in the State of Colorado and provide connectivity and access for State Edge Sites and State agency End Sites. Backbone and ANAP design and implementation should take into account anticipated growth needs and the potential participation of the private sector. Each ANAP must be scalable to permit the potential investment and participation of other public/non-profit users. State Statute requires State ANAPs to provide connectivity to "Local ANAPs" carrying additional users that will be created through the "Beanpole" Bill (Refer to Attachment 5.1 for drawing and Bill).

State government has a presence in virtually every community in the state. Initially, the majority of telecommunication traffic from these communities will be destined for Denver. As the "Beanpole Bill" is implemented, bringing schools and libraries into the "cloud", demand for incremental bandwidth for such things as distance learning and interactive multi-media applications across the state will become common.

The Offeror shall respond to the following ATM Service Offerings and Technical Specifications to be made available from all ANAP locations:

3.3.2.2.1 Requirement: The Offeror's response to the RFP shall describe how they will address ANAP and SANAP extensions into the "cloud" and their connectivity and bandwidth requirements. Other related issues, such as collocation of facilities and ANAP equipment specifications and capabilities, as well as interconnection to the backbone, shall also be addressed.

3.3.2.2.2 Requirement: The MNT high-speed communication links to the ANAPs, SANAPs, Edge Sites and State agency End Sites must be based on industry accepted standards and specifications from the ATM Forum, IETF, ITU, IEEE, Bellcore and ANSI. (M)

3.3.2.2.3 Requirement: The MNT network "cloud" must be based on ATM technology. (M)

3.3.2.2.4 Requirement: Emerging Standards: In some cases this specification refers to standards which are not yet formally adopted or published. These specifications intentionally look to the future and attempts to codify an operational capability deemed necessary by the State based on expected evolution of standards, not merely based upon what is adopted today. It is recognized that standards are the basis for enabling the Offeror and their equipment manufacturers to develop, produce and market products

which meet the specified requirements and which are interoperable with other like-function products. This makes them extremely important to State network functionality. **Where unpublished standards are used in this specification, a "grace period" of 12 months from adoption is given wherein the Offeror and their chosen manufacturers will be automatically exempted from compliance. In some cases, when specific company acquisitions occur, the State will consider manufacturer's products which are non-compliant with either already existing standards or with specific requirements defined in this specification. Policy, guidelines and process for case-by-case consideration of waiver in these situations are described in Attachment 5.6. (Also refer to Scope of Work contract provision 1.4.2.)**

3.3.2.2.5 Requirement: ATM switching capabilities must support all current standards, features and options on which these requirements are based. (M)

3.3.2.2.6 Requirement: All future ATM Forum standards, features and options on which these requirements are based shall be supported within 12 months of ratification by the ATM Forum.

3.3.2.2.7 Requirement: The Offeror shall specify what the minimum parameters for voice communications, video communications and high-priority, interactive data and video communications shall be for the following:

- **Throughput**
- **Delay**
- **Jitter**
- **Packet Loss/Dropped Packets**
- **Cell Loss Ratio**

3.3.2.2.8 Requirement: Accurate timing, traceable to a Stratum I source, must be available at the Offeror's interface to all State ANAP, SANAP and Edge Site locations. (M)

3.3.2.2.9 Requirement: The Offeror must be able to provide incremental and variable bandwidth allocations on a per Mb basis and include a description of bandwidth offerings. (M)

3.3.2.2.10 Requirement: The Offeror must comply to all ATM service offerings with at least the ATM Forum User-Network Interface (UNI) Signaling Specification, Version 3.1 with plans to upgrade to UNI 4.0 and include a schedule for such an upgrade, (M)

3.3.2.2.11 Requirement: The MNT network "cloud" must support logical network connections and paths in the form of Permanent Virtual Circuits (PVCs). (M)

3.3.2.2.12 Requirement: The MNT network "cloud" shall support logical network connections and paths in the form Switched Virtual Circuits (SVCs). Offeror shall

describe its ability and willingness to do this. According to UNI 4.0 specifications, describe the addressing structure to be used in support of SVC point-point calls. Show how address translations between State Customer Premise Equipment (CPE) and the public network ATM "cloud" will be handled.

3.3.2.2.13 Requirement: Offeror shall describe parameters on which SVC billing will be based and any billing issues that may be unresolved.

3.3.2.2.14 Requirement: The MNT network "cloud" must provide and support Circuit Emulation (CE) necessary for time sensitive applications such as voice, video and Time Division Multiplexing (TDM). (M)

3.3.2.2.15 Requirement: ATM to Frame Relay Interworking must be provided for DS-0 and DS-1 rates throughout the entire "cloud". If Frame Relay service is not provided by the Offeror, co-location of the providing vendor's terminations must be accommodated. (M)

> **Note: Because of the extensive nature of the current State Frame Relay network, this requirement is mandatory within Phase I of implementation.**

3.3.2.2.16 Requirement: The MNT network "cloud" shall support logical point-to-Multipoint connections in the form of PVCs.

3.3.2.2.17 Requirement: The MNT network "cloud" shall support logical point-to-Multipoint connections in the form of SVCs.

3.3.2.2.18 Requirement: The MNT network "cloud" shall support Inverse Multiplexing over ATM (IMA).

3.3.2.2.19 Requirement: The Offeror shall implement Multi-Protocol Switching (MPLS), upon expected completion of standards. This will allow transport of IP over ATM with the Quality of Service (QOS) required by State applications, reducing latency and increasing throughput.

Offeror response shall include an anticipated schedule for such an implementation.

3.3.2.2.20 Requirement: The Offeror shall implement PNNI 1.0 with upgrade to PNNI 2.0 upon completion of standards.

3.3.2.2.21 Requirement: For those offering dial tone capabilities from their facilities, an integration of narrowband voice and ATM (i.e. Circuit Emulation, AAL.2, etc.) must be available at ANAP locations to SANAPs, and Edge Sites from the ATM "cloud". (M)

Offeror shall describe their ability to do this, what method or methods of integration they would use, and, what Phase of implementation the offerings would be available. (Reminder: All services must conform to published standards.)

3.3.2.2.22 Requirement: The Offeror shall provide full integration between voice (SS7 signaling) and ATM when available.

Offeror shall describe their ability to do this, what method or methods of integration they would use, and, what Phase of implementation the offerings would be available.

3.3.2.2.23 Requirement: Offeror shall specify other or alternative service offerings or methods that are being considered for the MNT wide area network but are not necessarily ready through approved specifications and production implementation. Also provide an anticipated service release date if not currently ready.

3.3.2.2.24 Requirement: The Offerors (Prime and Sub-Contractors) shall provide a geographic map of ANAP locations with clear detail of all service areas they each support (i.e. counties, cities, towns, etc.). Include bandwidth capabilities and all services, advanced and otherwise, that can be provided from each ANAP to their supported locations. Describe any requirements by the Offeror for State assistance for ANAP locations. (M)

3.3.2.2.25 Requirement: The Offeror shall list all switch and equipment manufacturers used in the backbone network at ANAP locations. Describe all communications equipment capabilities and their adherence to existing standards. Describe any proven interoperability tests with other manufacturer's edge switches and devices.

3.3.2.2.26 Requirement: The "Beanpole Bill" will result in additional opportunities for the establishment of "Local ANAPs" within the communities they service. The Offeror shall address their ability to accommodate additional infrastructure within these communities to the MNT backbone. The Offeror shall also describe any co-location issues that may result and their ability to accommodate them.

3.3.2.2.27 Requirement: All MNT ANAP offerings must be Year-2000 compliant. (M)

3.3.2.3 Traffic Management and Quality of Service (QOS) Parameters

ATM technology, the core transport mechanism requested for the MNT, is intended to support a wide variety of services and applications. The control of ATM network traffic is fundamentally related to the ability of the network to provide appropriately differentiated Quality of Service (QOS) for network applications through an appropriate traffic contract and service categories. Each service category defines traffic contract parameters and QOS parameters. This is necessary for support of applications requiring

different delay and loss performance such as Voice, Packet data (IP, FR), Video, Imaging and Circuit Emulation.

A primary role of traffic management is to protect the network and end-system from congestion in order to achieve network performance objectives. An additional role is to promote the efficient use of network resources. Traffic shaping will be used to ensure that cell streams generated by an ATM device for a particular connection will conform to the contract to prevent discard of violating cells. Traffic policing must also be used to determine conformance of an arriving cell stream to the contracted traffic parameters.

The architecture for ATM virtual connections required by the State at the ATM layer consists of the following five service categories according to the ATM Forum Traffic Management, Version 4.0, Specification. All service categories will apply to PVC and SVC, VCCs and VPCs. All technical requirements will be based on approved standards and specifications according to the ATM Forum, IETF, ITU, IEEE, Bellcore and ANSI.

The required service categories that must be provided are:

3.3.2.3.1 Requirement: Constant Bit Rate (CBR) – Supports real-time applications requiring a fixed amount of bandwidth. Supports tightly constrained Cell Transfer Delay (CTD) and Cell Delay Variation (CDV) for applications that cannot tolerate variations in delay such as voice, constant-bit-rate video, and Circuit Emulation Services (CES). (M)

3.3.2.3.2 Requirement: Real time Variable Bit Rate (rt-VBR) – Supports time-sensitive applications which also require constrained delay and delay variation requirements but transmit at a varying rate. Such bursty, delay-variation-sensitive sources are voice and variable-bit-rate video. (M)

3.3.2.3.3 Requirement: Non-real time Variable Bit Rate (nrt-VBR) – Supports applications that have no constraints on delay and delay variation, but which still have variable-rate, bursty traffic characteristics. Such applications include packet data transfers, terminal sessions, and file transfers. (M)

3.3.2.3.4 Requirement: Unspecified Bit Rate (UBR) – This service category is a "best effort" service, which does not require tightly constrained delay and delay variation and provides no specific quality of service or guaranteed throughput. Most LANs and IP implementations provide a "best effort" service today. (M)

3.3.2.3.5 Requirement: Available Bit Rate (ABR) – The aim of this service is to provide access to bandwidth currently not in use by other service categories to users who can adjust their transmission rate. In exchange for this cooperation by the user, the network provides a service with very low loss. ABR service does not provide bounded delay variation. Good candidates for ABR are LAN interconnection, high performance file transfers, database archival, non-time-sensitive traffic and web browsing.

3.3.2.3.6 Other Considerations:

3.3.2.3.6.1 Cell Delay Variation (CDV) -- CDV is essential for Constant Bit Rate (CBR) connection performance. Its value is necessary for the dimensioning of the elastic buffer required at the terminating end of the connection for absorbing the accumulated CDV, regardless of whether the network is public or private.

According to the ATM Forum's Traffic Management Specification Version 4.0, B.2.2.5, a common, maximum cell delay variation value for private, public and hybrid private/public networks is essential. As an implementation guideline, the receiver CDVT should be designed to handle the case where a connection traverses three networks, each having three switches in tandem.

3.3.2.3.6.2 Requirement: Respond as to how you will handle this recommendation in order to guarantee Constant Bit Rate connection performance. Please describe how much CDVT the public network will tolerate before it throws cells away for all service categories, classes of service and bandwidth allocations.

3.3.2.4 ANAP / SANAP Implementation

The installation of the required capabilities for all 70 ANAP/ SANAP locations will be over a 3-year phased implementation schedule. A table is provided (in Section IV) for those responding to the RFP to identify which of the 70 ANAP SANAP sites they propose to provide completed services to during each phase of the MNT implementation. Higher potential scores will be placed on those locations deemed *rural* through population studies. Less weight will be given to suburban areas and even less to urban areas with higher population levels. The weighting method is also designed to reward completion of rural sites in years one and two of implementation with higher scores than can be earned by suburban or urban site completions.

The following is a schedule of requirements within each phase:

3.3.2.4.1 Phase I - January, 2000 to December, 2000

Completed installation of the required telecommunications capabilities to the State of Colorado's ANAP and SANAP locations, a minimum of 21 access points (30%), as listed by the Offeror for Phase I, is required. Before each site is deemed completed, testing will be performed by the vendor with verification and testing by the State. **The Offeror shall provide all design, project management, and equipment necessary to meet all requirements listed in Section III of this RFP.**

3.3.2.4.2 Phase II - January 2001 to December, 2001

Completed installation of the required telecommunications capabilities to the State of Colorado's ANAP and SANAP locations, a minimum of 50% of the 70 total, as listed by the Offeror for Phase II, is required. This amounts to a total of 56 access points to be operational by the completion of Phase II. By the end of Phase II, a minimum of 80% of the required ANAP and SANAP sites shall be operational. Before each site is deemed completed, testing will be performed by the vendor with verification and testing by the State. **The Offeror shall provide all design, project management, and equipment necessary to meet all requirements listed in Section III of this RFP.**

3.3.2.4.3 Phase III - January, 2002 to December, 2002

Completed installation of the required telecommunications capabilities to the State of Colorado's ANAP and SANAP locations, the final 20% of the 70 total or remaining sites, as listed by the Offeror for Phase III, is required. This completes the 70 access points. Before each site is deemed completed, testing will be performed by the vendor with verification and testing by the State. **The Offeror shall provide all design, project management, and equipment necessary to meet all requirements listed in Section III of this RFP.**

3.3.2.4.4 ANAP / SANAP IMPLEMENTATION RESPONSE INSTRUCTIONS

Scoring information and response instructions for completion of ANAP / SANAP installations to meet the State of Colorado's Multi-Use Network requirements can be found in section IV of the RFP document. Responses will be entered in a table to indicate which of 70 locations will be completed in each of three one year implementation phases. The evaluation scoring system is designed to reward early completion of ANAP service offerings in rural areas.

3.3.2.4.5 ANAP / SANAP Implementation Detail

3.3.2.4.5.1 Requirement: The Offeror shall provide a detailed, phased implementation plan and schedule of services to be provided to all ANAP locations.

3.3.2.4.5.2 Requirement: The Offeror shall provide a detailed migration strategy for transitioning any existing State circuits, as determined by the Offeror and MNT project team upon implementation, to the MNT backbone infrastructure.

3.3.2.5 Connectivity to Edge Sites and State Agency End Sites

A major goal of the MNT is to provide the capability of connectivity and interoperability between all state agencies through one effective "cloud" of ATM and advanced services. As mentioned in Section I, there currently exist several State networks of limited capabilities trying to achieve this goal. As the MNT network is implemented through the build-out of backbone infrastructure and distributed ANAPs, these legacy networks will be rolled into, and upgraded to the MNT "cloud". Many of these connections currently ride on the State owned microwave system and many more circuits are leased through existing providers. (See existing contracts in Attachment 5.5.)

The primary purpose of this RFP is to extend communications to the many rural areas that have remained neglected and detached from the rise in technological advances. Even with the extension of advanced communications through the MNT backbone infrastructure and its ANAPs to all county locations it is imperative that such services also reach the End Site user community. The Offeror is encouraged to expand their capabilities and horizons to incorporate even the most remote locations through innovative devices and means.

3.3.2.5.1 Requirement: The Offeror shall describe their ability to provide connectivity to State Edge Sites listed in Attachment 5.4.

3.3.2.5.2 Requirement: The Offeror shall describe any local physical infrastructure and loop qualifications that could provide connectivity to State Agency End Sites. (See Attachment 5.7 for State End Sites.) State whether they are owned by the Offeror or the Offeror has acquired access to them through formed partnerships with local holding entities. List such partnerships, if any.

3.3.2.5.3 Requirement: The Offeror shall describe any additional or innovative methods of extended delivery of MNT infrastructure and services that will be available from Offeror. Detail any problem areas and possible solutions.

3.3.2.5.4 Requirement: The State requires that the following services be made available to all End Sites terminating within the MNT network "cloud":

- **Requirement: DS0, 56kbps/64kbps WAN Links must be provided to End Sites terminating within the MNT "cloud". (M)**

- **Requirement: DS-1, 1.544Mbps WAN Links must be provided to MNT End Sites terminating within the MNT "cloud". (M)**

- **Requirement: DS-3 ATM service shall be made available to End Sites terminating within the MNT "cloud".**

- **Requirement: Inverse Multiplexing over ATM (IMA) shall be made available to MNT End Sites terminating within the MNT "cloud".**

- The State desires that ISDN service be made available to End Sites terminating within the MNT "cloud".

- The State desires that Digital Subscriber Line (xDSL) be made available to End Sites terminating within the MNT "cloud"

- The State desires dial tone be provided to End Sites terminating within the MNT "cloud".

- The State desires VPN service offerings.

3.3.2.5.4.1 Requirement: The Offeror shall categorize all potential End Site locations listed in Attachment 5.7 according to scheduled availability and types of service offerings.

3.3.2.5.4.2 Requirement: The Offeror shall specify other or alternative service offerings or methods that are being considered for the MNT wide area network.

3.4 Management and Monitoring

The following section contains requirements that are intended to define the general monitoring and management needs of the State of Colorado for the Multi-Use Network implementation and on-going operations. This section is intended as a guideline for the Offeror and is not all-inclusive. The State is open to consideration of any additional management offerings that can be provided by the Offeror. This section includes both Technical and Business areas as follows:

3.4.1 Technical Monitoring and Management

The State of Colorado will retain ownership of all Edge ATM switches and devices terminating on the MNT backbone. Outsourced monitoring and management of this State owned equipment, and all MNT leased lines shall include the operations and capabilities in the following categories:

- Fault Management
- Configuration Management
- Accounting Management
- Performance Management
- Security Management

3.4.1.1 Requirement: The Offeror shall indicate their ability to provide this service.

3.4.1.2 Requirement: The Offeror shall support, at a minimum, the following Network Management standards:

- **Simple Network Management Protocol (SNMP)**
- **MIBs to support specifications throughout this RFP.**

The technical Monitoring and Management offering will be concerned with the installation, operation, monitoring, and upgrading of a physical infrastructure which can maximize quality, capacity, and reliability of service for State users.

3.4.1.3 Requirement: In addition to MNT Edge Sites, circuits, and devices, the Offeror shall provide a catalog of Monitoring and Management services that could be subscribed to by other state agencies for such End Site services.

3.4.1.4 Requirement: The Offeror shall provide all network management tools to track the network performance, monitor network status, report and track network trouble and generate management reports through their Network Operations Center (NOC). The proposed network management tools should include such features as traffic analysis, call detail recording, and reporting. Regular and web-based real-time monitoring and reporting requirements--aggregate and client/site specific--will need to be defined, established, and supported.